Lower Colorado River Multi-Species Conservation Program

Balancing Resource Use and Conservation

Establishing a Refuge Population of Endangered Humpback Chub (*Gila cypha*) at the Southwestern Native Aquatic Resources and Recovery Center (formerly Dexter National Fish Hatchery and Technology Center)

2012 Completion Report

U.S. Department of the Interior
Bureau of Reclamation

January 2013

Lower Colorado River Multi-Species Conservation Program Steering Committee Members

Federal Participant Group

Bureau of Reclamation
U.S. Fish and Wildlife Service
National Park Service
Bureau of Land Management
Bureau of Indian Affairs
Western Area Power Administration

Arizona Participant Group

Arizona Department of Water Resources
Arizona Electric Power Cooperative, Inc.
Arizona Game and Fish Department
Arizona Power Authority
Central Arizona Water Conservation District
Cibola Valley Irrigation and Drainage District
City of Bullhead City
City of Lake Havasu City
City of Mesa
City of Somerton
City of Yuma
Electrical District No. 3, Pinal County, Arizona
Golden Shores Water Conservation District
Mohave County Water Authority
Mohave Valley Irrigation and Drainage District
Mohave Water Conservation District
North Gila Valley Irrigation and Drainage District
Town of Fredonia
Town of Thatcher
Town of Wickenburg
Salt River Project Agricultural Improvement and Power District
Unit "B" Irrigation and Drainage District
Wellton-Mohawk Irrigation and Drainage District
Yuma County Water Users' Association
Yuma Irrigation District
Yuma Mesa Irrigation and Drainage District

Other Interested Parties Participant Group

QuadState Local Governments Authority
Desert Wildlife Unlimited

California Participant Group

California Department of Fish and Wildlife
City of Needles
Coachella Valley Water District
Colorado River Board of California
Bard Water District
Imperial Irrigation District
Los Angeles Department of Water and Power
Palo Verde Irrigation District
San Diego County Water Authority
Southern California Edison Company
Southern California Public Power Authority
The Metropolitan Water District of Southern California

Nevada Participant Group

Colorado River Commission of Nevada
Nevada Department of Wildlife
Southern Nevada Water Authority
Colorado River Commission Power Users
Basic Water Company

Native American Participant Group

Hualapai Tribe
Colorado River Indian Tribes
Chemehuevi Indian Tribe

Conservation Participant Group

Ducks Unlimited
Lower Colorado River RC&D Area, Inc.
The Nature Conservancy

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2012 Completion Report

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Lower Colorado River
Multi-Species Conservation Program
Bureau of Reclamation
Lower Colorado Region
Boulder City, Nevada
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INTRODUCTION

In October of 2012 Dexter National Fish Hatchery and Technology Center's name was officially changed to the Southwestern Native Aquatic Resources and Recovery Center (SNARRC). The facility is located in the Pecos River Valley of southeastern New Mexico, 200 miles southeast of Albuquerque, 20 miles south of Roswell, and one mile east of Dexter on State Road 190.

The purpose of this project is to develop a captive population (refugia) for protecting and/or enhancing the wild population of humpback chub in the Grand Canyon as outlined in the Humpback Chub Recovery Plan (U.S. Fish and Wildlife Service.1990). This project employs a conservation and management action to protect the species against potential future catastrophic loss in its primary habitat the Little Colorado River (LCR). A refuge population of humpback chub is essential to help meet future species needs due to the recent decline of the Grand Canyon population to its lowest level in over a decade. In the fall/winter of 2008, the U.S. Fish and Wildlife Service began establishing a refuge population of Grand Canyon humpback chub at SNARRC (formerly Dexter NFH& TC), Dexter, New Mexico in collaboration with the Bureau of Reclamation, USFWS Arizona Fish and Wildlife Conservation Office, and the National Park Service in fulfillment of Work Task C14, under the Fish Augmentation portion of the Lower Colorado River Multi-Species Conservation Program.

SNARRC contains the expertise, infrastructure, security and biohazard backup systems to provide appropriate care for the fish and reduce risk of loss. The genetic refuge and captive propagation program being developed and implemented at the facility, follows guidelines outlined in the September 5, 2008 USFWS **"**Genetic Management Plan for Captive and Translocated Endangered Humpback Chub in the Lower Colorado River Basin". The plan includes a broodstock management strategy for the Grand Canyon population.

This project is conducted under the authority of the Endangered Species Act. The US Fish & Wildlife Service's "Policy Regarding Controlled Propagation of Species Listed under the Endangered Species Act" (65 FR 56916) addresses the housing of refuge populations, as well as captive propagation activities. All of the safeguards recommended in said policy are followed, with the ultimate goal being to protect the genetic integrity of wild humpback chub.

REPORTING PERIOD: January 01, 2012 through March 30, 2013

PROJECT DURATION March 30, 2013

PROJECT OBJECTIVES

Establish and maintain a humpback chub refuge population from fish collected from the LCR. Maintain the stock in a secure environment and protect against catastrophic loss in the wild or captivity and ensure the stock is available for propagation to augment the wild population if the need arises.

(1) Develop, maintain and staff facilities at SNARRC necessary to implement refuge requirements identified in the **"**Genetic Management Plan for Captive and Translocated Endangered Humpback Chub in the Lower Colorado River Basin" (USFWS September 5, 2008*)*.

(2) Establish a 500 to 1000 adult fish refuge population from fish collected from the LCR (2008-2012).

(3) Transfer (38-99YC) adult humpback chub from Willow Beach NFH to SNARRC.

(4) Evaluate and refine fish culture, marking and transport methodologies for wild caught humpback chub.

(5) Complete acute toxicity tests on humpback chub larvae and juveniles (90-160 mm) to determine median lethal concentration (LC50) of potassium chloride.

STUDY AREA

All fish culture and maintenance activities are completed at the USFWS, SNARRC located in the Pecos River Valley of southeastern New Mexico which is approximately 200 miles southeast of Albuquerque, 20 miles south of Roswell, and one mile east of Dexter on State Road 190. This project utilizes as many as eleven 3' diameter fiberglass tanks and associated systems in the newly built Isolation/Quarantine building and two 10' rectangular fiberglass tanks in the Fish Culture building. Once the fish reach the target size of 125-150mm in total length they are tagged with a passive integrated transponder (PIT) tag and maintained in one 40' outdoor raceway and two .10-.25 surface acre outdoor lined ponds.

METHODS

Project partners collect 300+ (50 – 120 mm total length (TL)) humpback chub from the LCR, Grand Canyon in late-July/August or October. The age-0 fish are collected in the lower 3 km of the river, upstream from the confluence with the mainstem Colorado River on Navajo Nation lands. Following collection, the fish are transported to SNARRC by truck for quarantine and eventual incorporation into the refuge population. All fish are handled with the best animal

husbandry practices available. Transport follows guidelines described in the USFWS Protocols for Biological Investigations developed by Dr. Gary Carmichael, retired U.S. Fish & Wildlife Service employee. Upon arrival, Dexter staff provide on-site monitoring for the species. The fish are counted and placed in 3' diameter fiberglass tanks for disease treatment and quarantine for up to 6 months. Nylon tank covers are placed on all tanks to stop fish from jumping out. Aeration and oxygen are supplied to the tank to ensure that oxygen levels are maintained at ≥6 ppm. The fish are treated twice with Praziquantel at 2 ppm for 24 hours static bath to control and remove cestodes. Dexter staff also administered 1 hour salt baths (uniodized), followed by static bath treatments of formalin at 125-150 ppm to control external bacteria, parasites and aquatic invasive species. These procedures continue for several weeks depending on the life cycle of the parasite being treated. A daily log recording water quality, temperature, treatments and comments on fish health is maintained.

Following completion of the quarantine period and two weeks prior to being moved to outdoor raceways, each fish is marked with a (PIT) tag and a tissue sample collected for future genetic identification and differentiation from natural recruitment that may occur in the rearing units. Staff monitor water quality (DO, pH, conductivity, and temperature) daily using a Yellow Springs Instruments (YSI) meter and record all water quality parameters, observations and mortalities daily. Fish are fed a combination of live, frozen and formulated feeds.

PROJECT RESULTS

As of January 2013 all objectives and requirements for this project have been completed.

In 2008, SNARRC staff began developing a humpback chub refuge population in collaboration with Bureau of Reclamation, National Park Service, and U.S. Fish and Wildlife Service partners. During the 5 year life of the project, Center staff successfully transported, cultured and PIT tagged HBC collected from the LCR using modified warm water fish culture and handling techniques. The primary objective of creating the 1,000 fish refuge population was achieved on July 12, 2012 when SNARRC received the final 702, (40-60mm) wild caught humpback chub collected from the LCR, Grand Canyon. Approximately 180 fish were added to the existing refuge population and the additional 500 fish reared for translocation purposes, with 200 going to Shinumo Creek and 300 to Havasu Creek in May of 2013.

The refuge population was inventoried in December, 2012 and is comprised of 1032 individuals from five year classes (Table 1). In addition to the refuge population, the facility also maintained humpback chub adults and F1's received from Willow Beach NFH, Willow Beach, AZ on January 15, 2009, (Table 2). In 2012 the entire refuge population was genetically screened and genotyped. A total of 19 microsatellite markers were used for the initial analysis and data interpretation and statistical analysis was completed in 2012.

Throughout the course of the project, successful PIT tagging protocols were developed for the species and the draft USFWS "Genetic Management Plan for Captive and Translocated Endangered Humpback Chub in the Lower Colorado River Basin" was completed. Indoor and outdoor facilities were used to maintain and culture the fish. When held indoor the fish were cultured in 18.0^{o} to 22.5^{o}C water and grew an average of .31mm in length per day. The minimum PIT tagging target size of 100mm in total length is achieved in six months. At the time of tagging the fish averaged 125-128mm in total length and 15.3-18.61 grams each; PIT tags are injected intraperitoneal and tag retention has ranged from 98 to100% with 100% survival.

In 2011, the acute toxicity of potassium chloride (KCl) to two life stages of humpback chub (7-day post-hatch larvae and 50 and 100 mm juvenile) were conducted and the results provided in the 2011 HBC accomplishment report. In addition to the LC_{50} studies, adult humpback chub were spawned in late April, 2011 and newly hatched larvae and 60 day old fish were provided to the USGS, Grand Canyon Monitoring and Research Center in Flagstaff, AZ for research studies to evaluate effects of turbidity and temperature on predation vulnerability by rainbow and brown trout.

The gauge used at SNARRC to determine the success of the program was the % survival at each critical control point. HBC were transported from the LCR to Dexter and vice versa for translocation activities a total of 8 times. Each trip logged over 600 miles (> 10 hours transport time) by truck and a 45 minute helicopter flight in or out of the LCR in ice chests. Survival rates during transport to and from Dexter have ranged from 98 -100%. Survival rates following receipt of the fish at Dexter vary with cohort and range from 98 to 99 % during the quarantine period and 97.7% to 99.6% over a four year period.

Table 1. Composition of humpback chub refuge population at SNARRC, Dexter, NM.

Collection Date	Number	Age class
July- October 2008	277	4
July- October 2009	205	3
July 2010	175	2
November 2011	200	1
July 2012	175	< 1
Total	**1032**	

Table 2. Survival of humpback chub adults received from Willow Beach NFH.

Fish Lot	Number received 01-15-2009	Number on hand 12-31-2012	% survival over 3 year period
99 Year Class Adults	38	27	71
F1's	37	34	92
Total	**75**	**61**	**81**

PROPOSED SCHEDULE

Funds for this project will be expended by March of 2012. SNARRC will continue to maintain the humpback chub refuge population indefinitely. The utility of this population is to protect against catastrophic loss in the wild or captivity and ensure the stock is available for propagation to augment the wild population if the need arises.

SOUTHWESTERN NATIVE AQUATIC RESOURCES AND RECOVERY CENTER BUDGET:

Project Charges	
17% Admin Overhead	$11,324.72
O&M Labor Costs	$36,246.92
Materials and Supplies	$ 8,408.37
Feed	$ 839.71
Utilities & Equipment Maintenance	$ 2,338.30
Travel	$ 386.00
Total Expended as of 12-2012	**$59,544.02**

Projected Charges (Jan-March2013)	
O&M Labor Costs	$ 8,281.28
Utilities & Equipment Maintenance	$ 1,911.70
Total Projected Costs	$10,192.98
Total Project Funds for 2012-2013	**$69,737.00**

LITERATURE CITED

U.S. Fish and Wildlife Service. 1990. Humpback chub (*Gila cypha*) Recovery Plan: U.S. Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, Colorado.